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INTEGRATED PROCESS TUBE AND ELECTROSTATIC SHIELD,
ASSEMBLY THEREOF AND MANUFACTURE THEREOF

[0001] This non-provisional application claims the benefit of Provisional Application No. 60/414,420, filed September 30, 2002, the contents of which are incorporated in their entirety herewith.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates to plasma processing systems, more particularly, the present invention relates to an Electrostatically Shielded Radio Frequency plasma reactor and a method for manufacturing the same.

2. Description of Related Art

[0003] In many material processing applications and in the manufacturing and processing of semiconductors, Integrated Circuits (IC), displays and other electrical devices, a plasma reacts, or facilitates a reaction, with a substrate, such as a semiconductor wafer. For example, in order to fabricate ICs with submicron features using etch and deposition processes, modern semiconductor processing systems may utilize plasma assisted techniques such as Reactive Ion Etching (RIE), Plasma Enhanced Chemical Vapor Deposition (PECVD), sputtering, reactive sputtering, and ion-assisted Plasma Vapor Deposition (PVD). In such known systems, a gas is introduced to a processing environment wherein a gas plasma is formed and maintained through the application of Radio Frequency (RF) power. To generate the plasma, power is supplied to a gas by an inductive or a capacitive plasma coupling element.

[0004] Conventionally, inductively coupled plasma reactors, specifically of the Electrostatically Shielded Radio Frequency (ESRF) type, generally include a plasma chamber located in a process tube. The plasma chamber is located in the center surrounded on the sides by the process tube. Located radially outside the process tube is an electrostatic shield, which can be a thin metal tube, conical or cylindrical in shape with longitudinal slots of some number around the periphery. A Radio Frequency (RF) coil is provided radially outward from the electrostatic shield.